

Database systems

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Database Concepts

- ✚ This course introduces the fundamental concepts necessary for designing, using, and implementing database systems and database applications.
- ✚ Our lectures stresses the fundamentals of database modeling and design, the languages and models provided by the database management systems, and database system implementation techniques.

✚ **Database:**

- ✚ A collection of related data.

✚ **Data:**

- ✚ Known facts that can be recorded and have an implicit meaning.

✚ **Mini-world:**

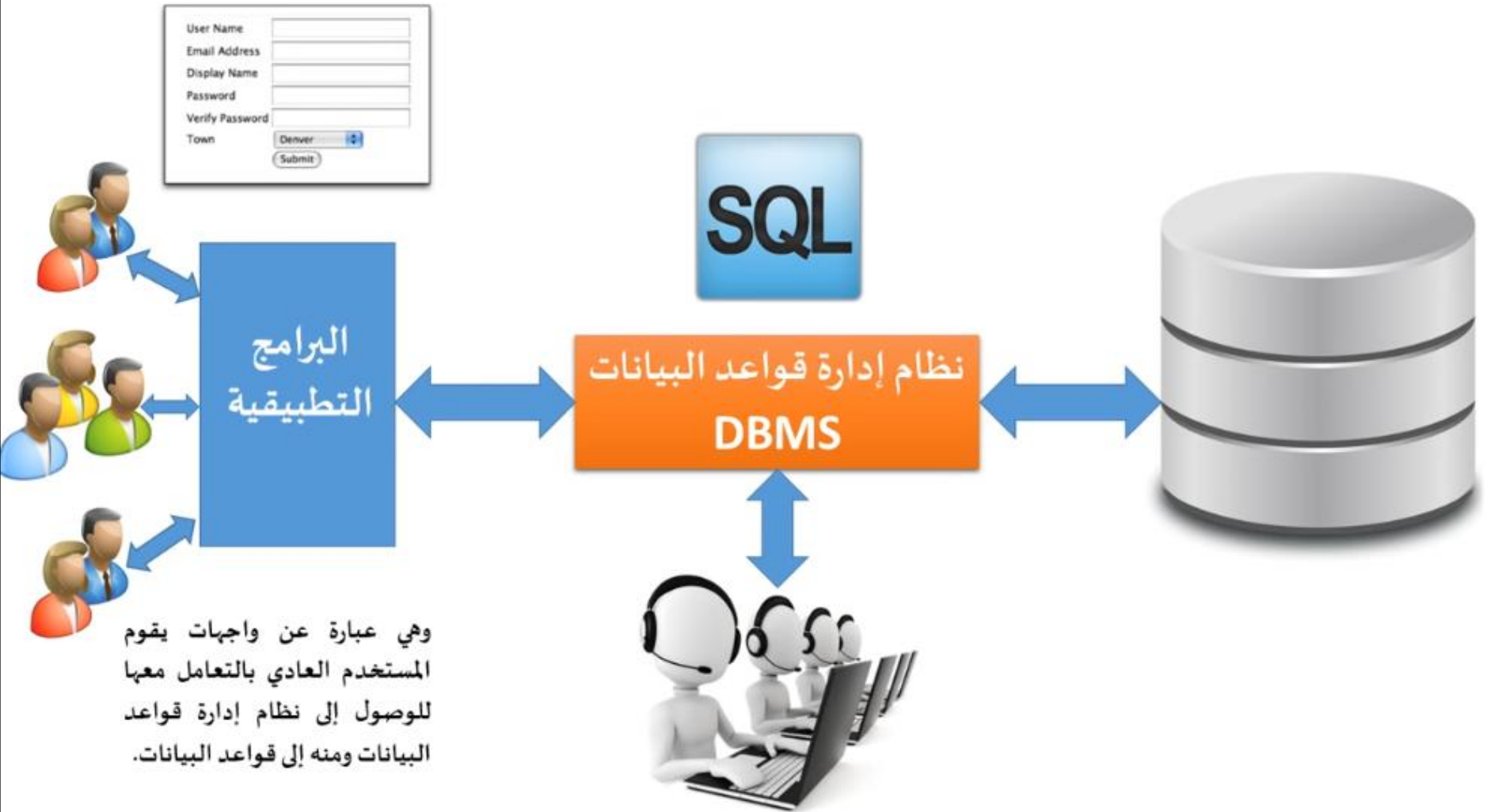
- ✚ Some part of the real world about which data is stored in a database. For example, student grades and transcripts at a university.

✚ **Database Management System (DBMS):**

- ✚ A software package/ system to facilitate the creation and maintenance of a computerized database.

✚ **Database System:**

- ✚ The DBMS software together with the data itself. Sometimes, the applications are also included.



Examinations/Grading

✚ Weekly Hours

✚ Lecture	1.5
✚ Lab	1.5

✚ Grading

✚ Final	60
✚ Mid Term	15
✚ Oral	10
✚ Lab	15
✚ Total	100

Textbook

✚ Text Book (required):

✚ *Fundamentals of Database Systems 7th Edition*

- By Ramez Elmasri and Shamkant B. Navathe.

✚ Lab

✚ *Oracle SQL*

Topics

❁ **Part 1: Introduction to Databases**

- ❁ Chapter 1: Databases and Database Users
- ❁ Chapter 2: Database Systems Concepts and Architecture

❁ **Part 2: Conceptual Data Modeling and Database Design**

- ❁ Chapter 3: Data Modeling Using the Entity Relationship (ER) Model

❁ **Part 3: The Relational Data Model and SQL**

- ❁ Chapter 5: The Relational Data Model and Relational Database Constraints
- ❁ Chapter 6: Basic SQL
- ❁ Chapter 7: More SQL: Complex Queries, Triggers, Views, and Schema Modification
- ❁ Chapter 9: Relational Database Design by ER-to-Relational Mapping

Part 1: Introduction to Databases

- ✚ Part 1 describes the basic introductory concepts necessary for a good understanding of database models, systems, and languages.
- ✚ **Chapters 1 and 2:** introduce databases, typical users, and DBMS concepts, terminology, and architecture, as well as a discussion of the progression of database technologies over time and a brief history of data models.
- ✚ These chapters have been updated to introduce some of the newer technologies such as NOSQL systems.

Part 2: Conceptual Data Modeling and Database Design

- ✿ Part 2 includes the presentation on entity-relationship modeling and database design;
 - ✦ **In Chapter 3:** the concepts of the Entity-Relationship (ER) model and ER diagrams are presented and used to illustrate conceptual database design.
 - ✦ The notation for the class diagrams of UML are also introduced in Chapters 7 and 8 as an alternative model and diagrammatic notation for ER/EER diagrams.

Part 3: The Relational Data Model and SQL

- Part 3 includes a detailed presentation on relational databases and SQL with some additional new material in the SQL chapters to cover a few SQL constructs that were not in the previous edition.
 - ❖ **Chapter 5:** describes the basic relational model, its integrity constraints, and update operations.
 - ❖ **Chapter 6:** describes some of the basic parts of the SQL standard for relational databases, including data definition, data modification operations, and simple SQL queries.

Part 3: The Relational Data Model and SQL

- ❖ **Chapter 7:** presents more complex SQL queries, as well as the SQL concepts of triggers, assertions, views, and schema modification.
- ❖ **Chapter 9:** covers ER -to-relational mapping, which are algorithms that can be used for designing a relational database schema from a conceptual ER/EER schema design.
- ❖ **Chapter 14:** Normalization